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The Chandra Galactic Bulge Survey: X-ray Binaries, Cataclysmic Variables, and Some Surprises

The Chandra Galactic Bulge Survey (GBS) is a multi-wavelength survey covering ~5% of the Galaxy's stellar mass with 2 6x1degree strips above and below the Galactic Plane, including deep r' and i' imaging and time domain photometry and shallow, wide-field X-ray imaging with Chandra. Targeting fields above |b|=1 avoids most of the copious extinction along the Galactic Plane while maintaining high source density. This results in targets that are accessible to follow up in optical and NIR wavelengths. The X-ray observations are shallow to maximize the number of quiescent Low Mass X-ray Binaries (LMXBs) relative to Cataclysmic Variables (CVs) and coronally active stars. The goals of the GBS are to conduct a census of Low Mass X-ray Binaries in the Milky Way in order to constrain models of binary evolution, the common envelope phase in particular, and to expand the number of known LMXBs for optical follow up. Mass measurements in particular will help constrain the black hole (BH) mass distribution and the equation of state for neutron stars (NS). Constraining the BH mass distribution will constrain models of their formation in supernova. The current population of Galactic BHs suffers from selection effects, which the GBS avoids by finding new objects while still in quiescence. We expect to find qLMXBs, magnetic CVs, RS CVn stars, and smaller numbers of other types of sources. After removing duplicates, there are 1640 unique X-ray sources in the 12 square degree survey area, which closely matches the predicted number of 1648. We are currently matching X-ray sources to counterparts in other wavelengths using new photometric and spectroscopic observations as well as in archival data where it exists, and searching for variability and periodicity in the counterparts in photometric data. We have identified 8 Dwarf Nova outbursts, 27 eclipsing binaries, and 28 interacting binaries including promising candidates for new quiescent black holes.

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